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Dr. M. Nirenberg
Laboratory of Biochemical Genetics
National Heart and Lung Institute
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Bethesda, Maryland 20014

Dear Dr. Nirenberg:

Thank you for sending me a reprint of "Acetylcholinesterase in neuroblastoma cells". I am particularly interested to see the inverse relationships between AChE activity and cell division. My laboratory is concerned with the problem of sensory physiology, and we have been studying several developmental systems that also have interesting electrical properties. I have shown that phytochrome, the light receptor that mediates all photoperiodic phenomena in higher plants, is itself regulated by ACh (as in the enclosed reprint). Since ACh has now been implicated in several animal systems as a developmental regulator (e.g. Gustafson and Toneby, Exp. Cell Res. 62: 102-117 (1970)), I am curious as to whether or not you have measured the ACh concentration in your cells when they are or are not dividing. As you can see in figures 6 and 7 of the enclosed reprint, the ACh levels are especially high in buds and secondary roots, the only organs in which cell division may be said to be actively occurring. Whether or not this is due to decreased AChE activity, or increased acetylcholine synthesis remains to be seen. We have just now succeeded in demonstrating true AChE activity, and are beginning to look for choline acetyltransferase activity in the secondary roots.

Although ACh is best known for its role as a neuro-transmitter, it seems to be found in all living cells including prokaryotic cells. In addition to its control of membrane permeability (Table VI, and much animal work), might it not be that its primary function evolved to regulate cell division, and that its role in nerves, etc. is, in fact, regressive, with the advent of an auxiliary system to protect against division?

I hope ultimately to be able to explain the mode of action of ACh in our system, and have taken the approach of studying its interaction with each organelle in turn. In addition to the obvious effect of ACh on the cell membrane, we have also demonstrated a clear cut and unexpected type of mitochondrial regulation, and have preliminary evidence that the nuclear envelope is strongly effected by ACh. If you are interested, I shall send you reprints of those papers when they appear.

Very truly yours,



M. J. Jaffe
Asst. Prof.